To: Department of Commerce - National Telecommunications and Information Administration (NTIA)

Department of Agriculture – Rural Utilities Service

RE: 090309298-9299-01 – Join request for information

Subject: Department of Commerce use of funds made available by NTIA's Broadband Technology Opportunities Program (BTOP) to bring high-speed Internet to presently unserved and underserved rural areas

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Table of Contents

Executive Summary

BTOP FUNDS SHOULD BE USED FOR WIRED COMMUNICATIONS.

The EMR Policy Institute recommends that the Department of Commerce use the funds made available by the NTIA's Broadband Technology Opportunities Program (BTOP) to expand fiberoptic and hard wired communication infrastructure rather than wireless communications such as Broadband over Power Lines or wireless networks to bring high-speed Internet to presently unserved and underserved rural areas. The electromagnetic radiation from wireless communications damages citizens, particularly children. These risks are summarized in the review articles in the current issue of Pathophysiology (Exhibit A) that are based on *The BioInitiative Report* (www.bioinitiative.org). On April 2, 2009 the European Parliament passed a resolution warning of dangers to children and workers and urging the adoption of stricter exposure standards throughout Europe. http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2009-0216+0+DOC+XML+V0//EN. (Exhibit B)

PUBLIC HEALTH NOT PROTECTED BY FCC RF SAFETY LIMITS.

Most of the existing limits on this form of radiation, including the FCC's guidelines for human exposure to radiofrequency radiation, are 1 to 4 thousand times too lenient to prudently protect humans from adverse health effects ranging from Alzheimer's and other neurodegenerative diseases, reproduction problems, sleep reduction, learning problems, memory deficits, slowed ability of the body to repair damage, interference with immune function, cancer and electro hypersensitivity. The increasing danger to children and the inadequacy of the FCC RF limits for long-term exposure were examined in the Sept. 25, 2008 - US Congressional hearing - Cell Phone Use and Tumors: What the Science Says convened by Congressman Dennis Kucinich, Chairman of the Subcommittee on Domestic Policy of the House Committee on Oversight and Government Reform. http://domesticpolicy.oversight.house.gov/story.asp?ID=2199

MAJOR FEDERAL ACTION WARRANTS COMPLIANCE WITH NEPA.

Providing protection for human exposure to potentially unsafe levels of radio frequency ("RF") radiation as required by the National Environmental Policy Act (NEPA) will not

occur if broadband is employed in all presently unserved and underserved rural areas. Broadband deployment to all rural areas is a major federal action because it means that there would be no place left that people who do not wish to be exposed to this form of radiation or people who cannot physically tolerate this level of RF exposure could live.

Comment

THE EMR POLICY INSTITUTE MISSION

The EMR Policy Institute is a nonprofit organization whose mission is to foster a better understanding of the environmental and human biological effects from electromagnetic exposures www.emrpolicy.org. This goal is accomplished by working at the federal, state and international levels to foster appropriate, unbiased research and to create better cooperation between federal regulatory agencies with a stake in public health in order to mitigate unnecessary exposures that may be deemed to be hazardous. The unfettered use of electromagnetic radiation (EMR) - radiofrequency/microwave radiation (RF/MW) present in all wireless and communications technologies, as well as the extremely low frequencies (ELF) present in power line supplies - is ill advised given research that has accumulated over the last two decades.

Risks from wireless devices to children's health are a prime concern of The EMR Policy Institute. Wireless broadband on this scale would mean that every infant, toddler or child would experience the increased radiation from the deployment of this technology. Current safety standards have been developed with a model of the "average male" and do not address these characteristics of children's anatomy and physiology:

- The absorption of the electromagnetic radiation (EMR) in a child's head is considerably higher than that in the head of an adult.
- A child's brain has higher conductivity, smaller size, thinner skull bones, and a smaller distance from the antenna.
- A child's brain had higher sensitivity to EMR than an adult brain.
- A child's brain has higher sensitivity to the accumulation of the adverse effects under conditions of chronic exposure to EMR.
- EMR affects the formation of the process of higher nervous activity.
- A child's cells divide much more rapidly that an adult's so cell damage is more readily replicated.
- A child's immune system in not fully developed.

Current government limits do not protect the public from adverse health effects from electromagnetic radiation (EMR) emanating from devices such as power lines, cell phones and wireless internet devices and their associated antenna sites, TV and FM broadcast towers and radar.

BTOP FUNDS SHOULD BE USED FOR WIRED COMMUNICATIONS BECAUSE PUBLIC HEALTH IS NOT PROTECTED FROM BROADBAND RADATION BY FCC RF SAFETY LIMITS

Broadband sends electromagnetic energy throughout an area rather than directly through a shielded wire or cable to the electronic device being used. There is no evidence to show that broadband can meet levels that do not impact human health because compliance with the FCC RF limits does not protect the public. The FCC RF limits are several thousand times too lenient to protect health from broadband radiation. Based upon the scientific evidence set forth in *The BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF)* and a large body of additional research, the EMR Policy Institute finds the existing FCC standards grossly unprotective and recommends that the following limits of electromagnetic radiation should not exceed the following limits: (Areas impacted by broadband are underlined.)

I. Extremely-low frequency (ELF). Power Lines, appliances, interior electric wiring and other ELF-radiating devices

A. Homes, schools and places where children spend large amounts of time: 1 milligauss *(1mG) for new construction; 1 milligauss (1mG) for all existing occupied space retrofitted over time.
B. All other construction: 2 milligauss (2mG)

*A milligauss is a measure of ELF field strength used to describe magnetic fields from appliances, power lines, interior electrical wiring,etc. A milligauss, abbreviated, is mG. Just as the power density of high frequency RF fields can be described in μW/cm2 or the corresponding electrical field in V/m, the parameter most easily measured for ELF is the magnetic field.

II. Long-term (cumulative) Radiofrequency Radiation*(RF)
A. Outdoor Pulsed- such as cell phone antennas, radar, TV and FM

broadcast antennas, wireless internet antennas: One tenth of a microwatt per centimeter squared or 0.614 volts per meter. * (0.1 μW/cm2 or 0.614 V/m)

B. Indoor Radiofrequency Radiation (RF) such as cell phones, wireless internet equipment and the radiation that permeates buildings from outdoor sources. One hundredth of a microwatt per centimeter squared or 0.194 volts per meter (0.01 μW/cm2 or 0.194 V/m). Typically, RF power density from higher frequency outdoor sources such as UHF television or cell phone antenna base stations drops by a factor of ten when it permeates buildings. Lower frequency signals such as lower channel VHF TV and FM are not as severely attenuated as the higher frequencies.

Future research may demonstrate that these recommended levels are not protective enough; therefore, U.S federal policy makers should remain open to lowering them as the scientific evidence accumulates.

NAS FINDS FCC SAFETY STANDARDS DEFICIENT

The January 2008 NAS Report *Identification of Research Needs Relating to Potential Biological or Adverse Health Effects of Wireless Communication Devices* (NAS Report). confirm and support the EMR Policy Institute position that the FCC's RF Safety Guidelines do not take into account a number of factors needed to protect health: (Exhibit "C" pages 1-17 of the NAS Report http://www.nap.edu/catalog/12036.html.)

The committee judged that important research needs included, in order of appearance in the text, the following:

- *Characterization of exposure to juveniles, children, pregnant women, and fetuses from personal wireless devices and RF fields from base station antennas.*
- *Characterization of radiated electromagnetic fields for typical multiple-element base station antennas and exposures to affected individuals.*
- *Characterization of the dosimetry of evolving antenna configurations for cell phones and text messaging devices.*
- *Prospective epidemiologic cohort studies of children and pregnant women.*
- *Epidemiologic case-control studies of childhood cancers, including brain cancer.*
- *Prospective epidemiologic cohort studies of adults in a general population and retrospective cohorts with medium to high occupational exposures.*
- *Human laboratory studies that focus on possible adverse effects on electroencephalography activity and that include a sufficient number of subjects.*

- *Investigation of the effect of RF electromagnetic fields on neural networks.*
- *Evaluation of doses occurring on the microscopic level.*
- *Additional experimental research focused on the identification of potential biophysical and biochemical/molecular mechanisms of RF action.*

(Ex. B, p. 2)

* * *

Children

1. *Prospective Cohort Studies of Pregnancy and Childhood. Children are potentially exposed from conception through maternal wireless device use and then postnatally when they themselves become users of mobile phones.*
2. *Case-control Study of Children Mobile Phone Users and Brain Cancer. Owing to widespread use of mobile phones among children and adolescents and the possibility of relatively high exposures to the brain, investigation of the potential effects of RF fields in the development of childhood brain tumors is warranted.*

(Ex. C, p. 6)

* * *

Mechanisms

1. *The effect of RF electromagnetic fields on neural networks is a topic needing further investigation. There are indications that neural networks are a sensitive biological target.*
2. *Evaluation of doses occurring on the microscopic level is a topic needing further investigation.*

In Vivo and In Vitro Studies in Experimental Model Systems

1. *Additional experimental research focused on the identification of potential biophysical and biochemical/molecular mechanisms of RF action is considered to be of the highest priority.*
2. *Evaluation of doses occurring on the microscopic level is a topic needing further investigations.*

(Ex.C , p. 8)

* * *

The body of the full NAS Report (included herein by reference) identifies the following issues as not being covered by existing research and therefore are not addressed in current RF safety policy:

- *Are there differences in health effects of short-term vs. long-term exposure?*
- *Are there differences between local vs. whole-body exposures?*

- *Can the knowledge of biological effects from current signal types and exposure patterns be extrapolated to emerging exposure scenarios?*
- *Are there any biological effects that are not caused by an increase in tissue temperature (nonthermal effects)?*
- *Does RF exposure alter (synergize, antagonize, or potentiate) the biological effects of other chemical or physical agents?*
- *Are there differences in risk to children?*
- *Are there differences in risk to other subpopulations such as the elderly and individuals with underlying disease states?*

(Ex.C, pp. 11-12.)

* * *

Presently, there is negligible or relatively little knowledge of local SAR concentration (and likely heating) in close proximity to metallic adornments and implanted medical devices for the human body. Examples include metal rim glasses, earrings, and various prostheses (e.g., hearing aids, cochlear implants, cardiac pacemakers). Research is therefore lacking to quantify the enhanced SARs close to metallic implants and external metallic adornments.

(Ex. C, p. 16) (Emphasis added.)

* * *

Laboratory Exposure Systems

There is need for improved exposure systems for human laboratory studies. Furthermore, location-dependent field strength needs to be accounted for in the characterization of exposures. Most of the present-day exposure systems used in laboratory studies focus on the exposure of the head. Though exposures to the head are relevant for most cell phone exposures, whole-body exposures due to base stations are a research need. The laboratory exposure systems also need to include ELF and pertinent modulation protocols.

(Ex.C, p. 17.) (Emphasis added.)

The NAS (National Academy of Sciences**)** performs an unparalleled public service by bringing together committees of experts in all areas of scientific and technological endeavor. These experts serve *pro bono* to address critical national issues and give advice to the federal government and the public. Since its creation in 1863, the nation's leaders have often turned to the National Academies for advice on the scientific and technological issues that frequently pervade policy decisions. See: www.nationalacademies.org/about/history.html

FDA NOMINATED WIRELESS RF FOR TOXICOLOGICAL STUDIES

The FDA nominated radiofrequency radiation emissions of wireless communication devices to the National Toxicology Program (NTP) for Toxicological Studies ten years ago because of "widespread consumer and worker exposure" and because "the available data is inadequate to properly assess safety." FDA explains its nomination entitled: "Radiofrequency Radiation Emissions of Wireless Communication Devices," with the following statements:

> *Executive Summary*
>
> *Over 80 million Americans currently use wireless communications devices (e.g., cellular phones) with about 25 thousand news users daily. This translates into a potentially significant public health problem should the use of these devices even slightly increase the risk of adverse health effects. Currently cellular phones and other wireless communication devices are required to meet the radiofrequency radiation (RFR) exposure guidelines of the Federal Communications Commission (FCC), which were most recently revised in August 1996. The existing exposure guidelines are based on protection from acute injury from thermal effects of RFR exposure, and may not be protective against any non-thermal effects of chronic exposure. Animal exposure research reported in the literature suggests that low level exposures may increase the risk of cancer by mechanisms yet to be elucidated, but the data is conflicting and most of this research was not conducted with actual cellular phone radiation . . . There is currently insufficient scientific basis for concluding either that wireless communication technologies are safe or that they pose a risk to millions of users. A significant research effort, involving large well-planned animal experiments is needed to provide the basis to assess the risk to human health of wireless communications devices.*
>
> (Ex. D, p. 1) (Emphasis added.)
>
> * * *
>
> *B. Physical Properties of Wireless Radiation*
>
> *. . . Thermal effects are well established and form the biological basis for restricting exposure to RF fields. In contrast, non-thermal effects are not well established and, currently, do not form a scientifically acceptable basis for restricting human exposure to microwave radiation at those frequencies used by hand-held cellular telephones. A large number of biological effects have been reported in cell cultures and in animals, often in response to exposure to relatively low-level fields, which are not well established but which may have health implications and are, hence, the subject of on-going research. It is not scientifically possible to guarantee those non-thermal levels of microwave*

radiation, which do not cause deleterious effects for relatively short exposure, will not cause long-term adverse health effects.

Ex. D, p. 2) (Emphasis added.)

* * *

D. Regulatory Status

. . . Currently cellular phones and other wireless communication devices are required to meet the RFR exposure guidelines of the Federal Communications Commission (FCC), which were most recently revised in August 1996. Since the FCC is not a health agency, it sought and received guidance from the federal health agencies including the Environmental Protection Agency, the National Institute of Occupational Safety and Health, the Occupational Safety and Health Administration, and the FDA. These exposure guidelines incorporated the most recent exposure standards of the National Commission for Radiation Protection and the American National Standards institute, and are subject to continuing review and revision as new scientific information which could define a better basis for such exposure guidelines becomes available. As noted above, the existing exposure guidelines are based entirely on protection from acute injury from thermal effects of RF exposure, and may not be protective against any non-thermal effects of chronic exposures.

(Ex. D, p. 4) *(*Emphasis added.)

* * *

NATIONAL TOXICOLOGY PROGRAM (NTP) FACT SHEET

The NTP Fact Sheet describing the FDA nominated RF radiation study entitled: "Studies on Radiofrequency Radiation Emitted by Cellular Phones - Year 2005 makes the following statements about the research upon which the current FCC Radiofrequency Radiation exposure guidelines as based:

. . . The existing exposure guidelines are based on protection from acute injury from thermal effects of RFR exposure. Current data are insufficient to draw definitive conclusions concerning the adequacy of these guidelines to be protective against any non-thermal effects of chronic exposures.

Studies in laboratory animals are considered crucial for understanding whether exposure to RFR is adverse to human health because meaningful data from epidemiological studies (human population studies) of cellular phone use will not be available for many years. This is due to the long latency period between exposure to a carcinogenic agent and the diagnosis of a tumor. Most scientific organizations that have reviewed the results from laboratory studies conducted to-date, however, have concluded that they are not sufficient to

estimate potential human health cancer risks from low-level RFR exposures and long-term, multi-dose, animals studies are needed.

What is the NTP Doing?
The Food and Drug Administration (FDA) nominated RFR emissions of wireless communication devices to the [NTP] *for toxicology and carcinogenicity testing. The NTP has carefully evaluated the efforts underway and concluded that while they have an excellent probability of producing high quality results, additional studies may be warranted to more clearly define any potential hazards to the U.S. population.*

(Exhibit E p1) (Emphasis added.)

* * *

RECOMMENDATIONS OF *THE BIOINITIATIVE REPORT*

The August 2007 *Bioinitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF)(The BioInitiative Report)* sets forth significant recent scientific evidence that public health is not protected by the "RF Safety" Guidelines relied upon by the FCC. The complete report is hereto incorporated by reference as Exhibit "F" and is found at www.bioinitiative.org .

In July 2008, the peer-reviewed journal *Reviews in Environmental Health* published a synopsis of *The BioInitiative Repor*t authored by its coeditors David O. Carpenter MD, and Cindy Sage MA entitled, "Setting Prudent Public Health Policy for Electromagnetic Field Exposures," and is incorporated hereto it its entirety by reference as Exhibit "G". Pages 110-112 are attached hereto as Exhibit "H" and are the passage in which the authors identify why the approach to protecting public health demonstrated by FCC and other regulatory agencies lags behind current scientific evidence:

The basis on which most standard setting agencies justify their failure to set new safety limits for ELF and RF is nearly always that no certain proof of harm from exposure and no known mechanism of action have been presented. A demand for a causal level of evidence and scientific certainty is implicit in nearly all discussion on what are the appropriate safely standards for ELF and RF. This demand, however, runs counter to both the existing scientific evidence and good public health practice.

Two obvious factors work against governments taking action to set exposure guidelines based on current scientific evidence of risk:

- *Contemporary societies are very dependent upon electricity usage and RF communications, and anything that restricts current and future usage potentially has serious economic consequences.*
- *Power and communications industries have enormous political clout, and even provide support for a significant fraction of the research done on EMF.*

This state of affairs results in legislation that protects the status quo and scientific publications whose conclusions are not always based only on the observations of the research. This situation also hinders wise public health policy actions and the implementation of prevention strategies because of the huge financial investments already made in these technologies. Huss et al. /120/ analyzed 59 studies of the health effects of cell phone use and found that studies funded exclusively by industry were least likely to report a statistically significant result . . .

Defining a new exposure standard for RF is complex, if we are to address properly new scientific results for chronic exposure to pulsed radiofrequency (for example from cell towers, cell phones, and other wireless technologies). Whereas the evidence of serious harm is strong, knowledge regarding the relation between cumulative exposure and risk of disease is inadequate. Uncertainty about how low such standards might have to go to be prudent from a public health standpoint should not prevent reasonable efforts to respond to the information at hand. No lower limits for bio-effects and adverse health effects from RF have been established, and no assertion of safety at any level of wireless exposure (chronic exposure) can be made at this time. A major concern is the exposure of children. We strongly recommend that wired alternatives to WI-FI be implemented particularly in schools and libraries so that children will not be subjected to elevated RF levels until more is understood about possible health impacts.

The Bioinitiative Report /121/ presents a much more extensive and exhaustive discussion of the literature on health effects of both ELF and RF EMF than can be presented here. The Report contains a recommendation of an RF standard of 0.1 $\mu W/cm^2$, but with the full knowledge that hazards may be associated with even lower exposures.

This review has focused on those diseases for which the evidence of increased risk with EMF exposure is the strongest. Other biological effects and potential health outcomes are presented in detail in the BioInitiative Report /121/. The effects that drive the need for immediate action in lowering exposure are cancer and neurodegenerative diseases. Leukemia appears the cancer of greatest concern when the exposure to either ELF or RF is over the whole body, as is the case with most ELF exposures and exposure from RF towers. When exposure is focused on a part of the human body, such as is the case of the head in cell phone use, one sees cancers of the brain, acoustic nerve, or parotid gland. For these diseases, the evidence is clearly sufficient to warrant regulatory changes in public safety limits now, at levels that are widely reported to be associated with

increased risk of childhood leukemia and brain tumors. Exposure limits against these diseases will also likely be protective for other less-well-defined health impacts. The BioInitiative Report /121/ provides additional justification for the adoption of these levels to prevent the health hazards resulting from exposure to ELF and RF.

The evidence for hazards to human health from both ELF and RF EMF is sufficiently strong as to merit immediate steps to reduce exposure. Such a reduction can best be achieved by setting exposure goals that are lower than levels known to be associated with disease, even while understanding that these exposure goals are significantly lower than many current exposures. A reasonable approach would be a 1 mG (0.1 □T) planning limit for structures adjacent to all new or upgraded power lines, and for occupied space that affects sensitive receptors (homes, schools, day-care, pre-school, etc), and targets not to exceed 2 mG (0.2 □T) for all other occupied new construction. Although reconstructing all existing electrical distributions systems is not realistic, steps to reduce exposure from these existing systems should be encouraged. For RF EMF, setting a level with certainty is difficult. A precautionary action level would reasonably be 0.1 μW/cm2.

The proposals presented here reflect the evidence that a positive assertion of safety cannot be made with respect to chronic exposure to low-intensity levels of ELF and RF radiation.

(Ex. F, pp.110-112) (Emphasis added.)

EIS REQUIRED IF WIRELESS IS CONSIDERED

The Commerce Department is responsible for compliance with NEPA under the regulations issued by the President's Council on Environmental Quality (CEQ) found at 40 CFR 1500.

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> The primary purpose of an environmental impact statement is to serve as an action-forcing device to insure that the policies and goals defined in the Act are infused into the ongoing programs and actions of the Federal Government. 40 CFR 1502.
>
> Use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment. 40 CFR 1500.2 (e)
> 1

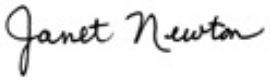
These studies set forth in this filing demonstrate to the Commerce Department that the use of wireless to provide high speed internet to the rural areas will have very significant environmental impacts because wireless broadband would greatly expand the human-

occupied areas subject to electromagnetic radiation and increase the quantity of electromagnetic radiation exposing the public. An Environmental Impact Statement is required to identify and assess reasonable alternatives to using technology that increases the electromagnetic radiation over so large an area and population

CONCLUSION

For these reasons the use of the funds for delivery of internet to rural areas should be limited to fiber optic or cable unless NTIA first performs a thorough review of the research and studies cited above and the preparation of an Environmental Impact Statement in full compliance with the National Environmental Policy Act.

The EMR Policy Institute



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LIST OF EXHIBITS

Exhibit A – Review articles from *Pathophysiology,* Volume 15, Issue 5, 2008, The Official Journal of the International Society for Pathophysiology, include:

Martin Blank, Preface, *Pathophysiology,* 2008. Volume 15 Issue 5.

Olle Johansson, The London Resolution, *Pathophysiology,* 2008. Volume 15 Issue 5.

Cindy Sage, David Carpenter, Public health implications of wireless technologies, *Pathophysiology,* 2008. Volume 15 Issue 5.

Hugo W. Ruediger, Genotoxic effects of radiofrequency electromagnetic fields, *Pathophysiology,* 2008. Volume 15 Issue 5.

Zoreh Davanipour, Eugene Sobel, Long-term exposure to magnetic fields and the risks of Alzheimer's disease and breast cancer: Further biological research, *Pathophysiology,* 2008. Volume 15 Issue 5.

Aris F. Pourlis, Reproductive and developmental effects of EMF in vertebrate animal models, *Pathophysiology,* 2008. Volume 15 Issue 5.

Martin Blank, Reba Goodman, Electromagnetic fields stress living cells, *Pathophysiology,* 2008. Volume 15 Issue 5.

Lennart Hardell, Michael Carlberg, Kjell Hansson Mild, Epidemiological evidence for an association between use of wireless phones and tumor diseases, *Pathophysiology,* 2008. Volume 15 Issue 5.

Paavo Huttunen, Osmo Hänninen, Risto Myllylä, FM-radio and TV tower signals can cause spontaneous hand movements near moving RF reflector, *Pathophysiology,* 2008. Volume 15 Issue 5.

Carl Blackman, Cell phone radiation: Evidence from ELF and RF studies supporting more inclusive risk identification and assessment, *Pathophysiology,* 2008. Volume 15 Issue 5.

Michael Kundi, Hans-Peter Hutter, Mobile phone base stations—Effects on wellbeing and health, *Pathophysiology,* 2008. Volume 15 Issue 5.

Alfonso Balmori, Electromagnetic pollution from phone masts. Effects on wildlife *Pathophysiology,* 2008. Volume 15 Issue 5.

J. L. Phillips, N.P. Singh, H. Lai, Electromagnetic fields and DNA damage, *Pathophysiology,* 2008. Volume 15 Issue 5.

Orjan Hallberg, Olle Johansson, Apparent decreases in Swedish public health indicators after 1997—Are they due to improved diagnostics or to environmental factors? *Pathophysiology,* 2008. Volume 15 Issue 5.

Exhibit B - European Parliament Resolution of 2 April 2009 on health concerns associated with electromagnetic fields (2008/2211(INI)

Exhibit C - "Identification of research needs relating to potential biological or adverse health effects of wireless communications devices," National Academy of Sciences Report NRSB-O-06-02-A, January 2008.

Exhibit D - "Radiofrequency Radiation Emissions of Wireless Communication Devices," Nomination from FDA's Center for Devices and Radiological Health (CDRH) to the National Toxicology Program, 1999.

Exhibit E.– "Studies on Radiofrequency Radiation Emitted by Cellular Phones," National Toxicology Program Fact Sheet Year 2005.

Exhibit F –*The BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF).* August 2007. www.bioinitiative.org

Exhibit G - David O. Carpenter MD, and Cindy Sage MA, "Setting Prudent Public Health Policy for Electromagnetic Field Exposures," *Reviews in Environmental Health:* Volume 23 No. 2, 2008.

Exhibit H – *Ibid. pp. 110-112.*